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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/057,225	01/25/2002	Leonard Forbes	303.506US4	3248

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EXAMINER

TRINH, MICHAEL MANH

ART UNIT PAPER NUMBER

2822

DATE MAILED: 02/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/057,225

Applicant(s)

FORBES, LEONARD

Examiner

Michael M Trinh

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-- Th MAILING DATE of this communication app ars on the cover sh et with th correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6. 6) ☐ Other: _____

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DETAILED ACTION

*** This office action is in response to Applicant's Amendment filed on November 25, 2002. Claims 1-30 are pending.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

*** Claim 30 is objected as including typographical error, wherein "32" should be --29--.

*** This application presents a claim for subject matter not originally claimed or embraced in the statement of the invention. Claims 1-30 are presented in this application. A supplemental oath or declaration is required under 37 CFR 1.67. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01 and 602.02.

Claim Rejections - 35 USC § 112

1. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention; and/or as based on a disclosure which is not enabling.

Re claim 4, specification including Patent 6,320,222 does not enable and support to form a transistor having a vertical body region on the first source/drain region, with the body region having a thickness of about 0.4 micron, as a fully depleted structure.

2. Claims 1-30 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Forming a first gate oxide prior forming a first gate on a first one of the opposing sidewall surfaces of the body region, and forming a second gate oxide prior to forming a second gate on a second one of the opposing sidewall surfaces of the body region are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure since, in the absence of first and second gate oxide in the base claims 1,8,9,13,14, 20, and 21, forming the first gate and second gate on the sidewall surfaces would make and render the transistor being short circuit. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

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3. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21, last two lines, "...the first and second oxides..." lack proper antecedent basis.

Specification and Drawings

4. The specification, itself, including Detailed Description section are objected as failing to explicitly provide description and drawing of the subject matter as claimed in claims 1-30 of the present application. Specification page 8 at Detailed description mentions the Patents 6,150,687 and 6,097,065, but it fails to mention the 6,320,222 Patent. The drawings are accordingly objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed features including silicon bulk substrate, vertically growing epitaxial layer, encasing ASG, BSG, etc., as recited in claims 1-30 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-13,21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noble et al (6,150,687) taken with Colinge (Article of "Reduction of Kink Effect...").

Noble teaches a method (Figs 5A-12; col 7, line 50 through col 11) for forming a transistor on a substrate comprising at least the main steps of: forming a first source/drain region 212 on the substrate; vertically forming a body region on the first source/drain region, wherein vertically forming the body region 214 includes vertically growing an epitaxial layer and

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wherein the body region includes opposing sidewall surfaces (Figs 5A-5F; cols 7, line 50 through col 8); forming a second source/drain region 216 on the body region; forming a first gate 206 on a first one of the opposing sidewall surfaces with a first gate oxide therebetween; forming a second gate 208 on a second oxide of the second one of the opposing sidewall surfaces with a second gate oxide therebetween (col 9), wherein forming first source/drain region by ion implantation, epitaxial growing or combination thereof (col 7, lines 50-67).

Noble lacks to form the body region as a fully depleted structure.

However, Colinge teaches to form a thin film transistor comprising a thin body channel region as fully depleted structure (page 97, left column; page 99), wherein the body region having a thickness of about 100 nm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the transistor body region of Noble to have a thin thickness as taught by Colinge so as to form the thin film transistor comprising a thin body channel region operated as fully depleted structure. This is because of the desirability to reduce kink effect, current overshoots, and to form a very thin transistor.

6. Claims 14-20,21,27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forbes et al (6,097,065) taken with Colinge (Article of "Reduction of Kink Effect...").

Forbes et al teach a method (Figs 4A-4o;1B-1H; col 9, line 60 through col 12; col 5-8) for forming a transistor on a substrate comprising at least the main steps of: vertically forming a body region extending outwardly from the substrate, wherein vertically forming body region includes forming the thin body region as a fully depleted structure, wherein vertically forming the body region includes opposing sidewall surfaces; forming a first source/drain region adjacent to the body region; forming a second source/drain region adjacent to the body region; forming a first gate (e.g. 160 in Fig 1D;463A,464B in Fig 4N) on a first one of the opposing sidewall surfaces with a first gate oxide therebetween; forming a second gate (e.g. 161 in Fig 1D; 463B, 464A in Fig 4N) on a second oxide of the second one of the opposing sidewall surfaces with a second gate oxide therebetween, wherein forming first source/drain region by CVD deposition of ASG or BSG, and then annealing (col 6 and col 11).

Forbes et al lack to form the body region as a fully depleted structure.

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However, Colinge teaches to form a thin film transistor comprising a thin body channel region as fully depleted structure (page 97, left column; page 99), wherein the body region having a thickness of about 100 nm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the transistor body region of Forbes to have a thin thickness as taught by Colinge so as to form the thin film transistor comprising a thin body channel region operated as fully depleted structure. This is because of the desirability to reduce kink effect, current overshoots, and to form a very thin transistor.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

(f) he did not himself invent the subject matter sought to be patented.

8. Claims 1-30 are rejected under 35 U.S.C. 102(f) as being clearly anticipated by the U.S. Patent No. 6,320,222 having the co-inventor named Wendell Noble.

As already remarked by Applicant, all elements of claims 1-30 are disclosed in the 6,320,222 Patent (See all Figures and text). Since the inventor named Leonard Forbes is the sole inventor in this present instant application, and since the Patent No. 6,320,222 includes the co-inventor named Wendell Noble (inventive entities are different), in the absence of an affidavit or declaration under 37 CFR 1.131 or an unequivocal declaration under 37 CFR 1.132 to show the contrary, it is alleged that Wendell Noble is also the inventor of the claimed and disclosed subject matter.

Accordingly, claims 1-30 are rejected as all limitations as claimed in claims 1-30 are clearly anticipated by Wendell Noble of the 6,320,222 Patent.

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9. Claims 1-30 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bertin et al (6,060,746).

Bertin et al teach a method (Figs 6,7,3A-9; cols 4-6) for forming a transistor on a substrate comprising at least the main steps of: forming a first source/drain region on the substrate; vertically forming a body region 19 on the first source/drain region 23,12 (Figs 6,7) as a fully depleted structure (col 2, lines 17-21), wherein vertically forming the body region 19 includes vertically growing an epitaxial layer and wherein the body region includes opposing sidewall surfaces (Figs 6,7; col 4, line 65 through col 5); forming a second source/drain region 22 on the body region; forming a first gate 15 on a first one of the opposing sidewall surfaces with a first gate oxide 18 therebetween (col 6); forming a second gate 15 on a second oxide 18 of the second one of the opposing sidewall surfaces with a second gate oxide therebetween, wherein forming first source/drain region by ion implantation, epitaxial growing or combination thereof (col 3, lines 40-47), wherein the body channel region having a thickness of 0.18 micron (col 2, lines 43-60), wherein the body region is encased with a ASG film and then annealing to diffuse the N-type dopant (col 5, lines 20-67), wherein CVD depositing and employing a BSG film as well known in the art for providing P-type dopant would have been obvious to one of ordinary skill in the art.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

10. Claims 1-30 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 6,320,222.

Although the conflicting claims are not identical, they are not patentably distinct from each other

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because Patent claims also include and recite a method for forming the dual-gate transistor on a substrate (e.g. claims 21 and 1-14 of Patent No. 6,320,222). Employing the method of the Patent claims for forming the transistor by the claimed method in the present application is apparent and would have been obvious to skill artisan, wherein scope of the claims of the present application is broad enough to encompass the scope of patent claims 1-22 of Patent No. 6,320,222.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Response to Amendment

*** Applicant's remarks filed November 25, 2002 with respect to claims 1-30 have been considered but are moot in view of the new ground(s) of rejection.

*** The new matter rejection is withdraw since Applicant remarked that the U.S. Patent 6,320,222 is corresponding to Applicant's attorney docket number 303.517US1, and disclosed all elements of the present claims 1-30.

*** It is noted and agreed with Applicant's remarks that "Elements of claims 1-30 not shown in Figures 1-3 are shown in the Figures of U.S. Patent No. 6,320,222,...in the detailed description for U.S. Patent No. 6,320,222...". However, it is still alleged that the present application including the specification, itself, detailed description and drawings fail to explicitly provide detailed description and drawing of the subject matter as claimed in claims 1-30 of the present application.

*** The obviousness-type double patenting rejection is maintained since no proper terminal disclaimer is timely submitted.

*** Rejection of claims 21 is maintained since it is not properly amended.

*** Regarding 35 USC 112 rejection of claims 112, first paragraph:

"Applicant respectfully requests that the Examiner provide a specific reference from the specification that indicates that his recitation is essential to claims 1-30..."

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In response, it is maintained that in the absence of first and second gate oxide in the base claims, forming the first gate and second gate on the sidewall surfaces would make and render the transistor being short circuit. In other word, it is respectfully request that Applicant provide a specific reference from the specification that indicates the first and second gate oxide are not essential and not essentially needed in making the MOSFET transistor as described in the present application including the Patent 6,320,222, and properly functioning as the MOSFET and no short circuit.

*** Regarding art rejections: the secondary reference of Collinge obviously teaches to form a transistor having a thin body region as fully depleted structure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

*** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (703) 308-2554. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs



Michael Trinh
Primary Examiner